What is claimed is:

1. A carbon nanotube-based device comprising:

a substrate;

a plurality of alloy catalytic nano-sized particles formed on the substrate; and

an aligned carbon nanotube array extending from the alloy catalytic nano-sized particles and progressively bending in a predetermined direction; wherein

said alloy catalytic nano-sized particles each comprise a catalyst material and a catalyst-doped material, the catalyst-doped material being capable of varying a reaction rate of synthesis of carbon nanotubes of the carbon nanotube array.

2. The carbon nanotube-based device as claimed in claim 1, wherein the substrate comprises silicon, quartz or glass.

3. The carbon nanotube-based device as claimed in claim 1, wherein the catalyst material is selected from the group consisting of iron, cobalt, nickel, molybdenum, ruthenium, manganese, and any suitable combination alloy thereof.

4. The carbon nanotube-based device as claimed in claim 1, wherein the catalyst-doped material comprises copper, molybdenum, or a combination of copper and molybdenum.

5. The carbon nanotube-based device as claimed in claim 1, wherein said catalyst-doped material is capable of either increasing or decreasing growing rates of said carbon nanotubes of the carbon nanotube array.

6. The carbon nanotube-based device as claimed in claim 1, wherein said catalyst-doped material gradually increases or decreases along another predetermined direction on said substrate.

7. The carbon nanotube-based device as claimed in claim 1, wherein said

catalyst-doped material is in a form of layer, and said layer is either thickened or thinned along another predetermined direction on said substrate.

8. A method for making a carbon nanotube-based device, the method comprising the steps of:

providing a substrate;

depositing a layer of catalyst on the substrate;

depositing a layer of catalyst-doped material on the catalyst layer for varying a reaction rate of synthesis of carbon nanotubes;

annealing the catalyst and the catalyst-doped material in an oxygen-containing gas at a low temperature; and

exposing the nano-sized particles and catalyst-doped material to a carbon-containing source gas at a predetermined temperature such that an aligned carbon nanotube array grows from the substrate.

9. The method in accordance with claim 8, wherein the substrate comprises silicon, glass or quartz.

10. The method in accordance with claim 8, wherein a material of the catalyst layer is selected from the group consisting of iron, cobalt, nickel, and any suitable combination alloy thereof.

11. The method in accordance with claim 8, wherein a thickness of the catalyst layer on the substrate is uniform, and is in the range from 2 nanometers to 10 nanometers.

12. The method in accordance with claim 8, wherein the catalyst-doped material comprises cobalt, nickel, molybdenum, copper, ruthenium, manganese or a combination of the materials thereof.

13. The method in accordance with claim 8, wherein a thickness of the catalyst-doped material layer is less than or equal to 10 nanometers.

14. The method in accordance with claim 8, wherein a thickness of the catalyst-doped material layer gradually decreases along a given direction.

15. The method in accordance with claim 9, wherein the depositing of the catalyst-doped material layer is performed by electron-beam evaporation deposition or thermal evaporation.

16. The method in accordance with claim 15, wherein an evaporation source of the thermal evaporation deposition is a linear evaporation source.

17. The method in accordance with claim 15, wherein an evaporation source of the thermal evaporation deposition is a point evaporation source moving along a line.

18. The method in accordance with claim 8, wherein said low temperature is in the range from 200°C to 400°C.

19. A carbon nanotube-based device comprising:

a substrate;

a plurality of alloy catalytic nano-sized particles formed on the substrate; and

an aligned carbon nanotube array respectively extending from the alloy catalytic nano-sized particles with gradually respective increasing or decreasing lengths of said carbon nanotubes of the carbon nanotube array arranged along a direction on said substrate; wherein

said alloy catalytic nano-sized particles each comprise a catalyst material and a catalyst-doped material, the catalyst-doped material being capable of varying a reaction rate of synthesis of carbon nanotubes of the carbon nanotube array.

20. The carbon nanotube-based device in accordance with claim 19, wherein said catalyst-doped material increases or decreases along said direction on said substrate.